Oculus Touch Teardown

Teardown of the Oculus Rift controllers, known as Oculus Touch, on December 7, 2016.

Written By: Sam Lionheart



INTRODUCTION

Oculus finally catches up with the big boys with the release of their ultra-responsive Oculus Touch controllers. Requiring a second IR camera and featuring a whole mess of tactile and capacitive input options, these controllers are bound to be chock full of IR LEDs and tons of exciting tech—but we'll only know for sure if we tear them down!

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TOOLS:

- T5 Torx Screwdriver (1)
- T6 Torx Screwdriver (1)
- iOpener (1)
- Soldering Station (1)
- iFixit Opening Tools (1)
- Spudger (1)
- Tweezers (1)

Step 1 — Oculus Touch Teardown







- Before we tear down, we take the opportunity to ogle the Oculus Touch system, which includes:
  - An additional Oculus Sensor
  - A Rockband adapter
  - Two IR-emitting Touch controllers with *finger tracking* and a mess of buttons

Step 2



- Using our spectrespecs fancy IR-viewing technology, we get an Oculus Sensor eye's view of the Touch controllers.
- While the twin black plastic halos are featureless to the naked eye, our camera sees the double rings of infrared LEDs residing beneath.
  - The LEDs, like those present in the headset, are arranged in distinct patterns, allowing the Oculus Sensor to pick out the headset and two controllers and determine their position and orientation.
- Also, thanks to the not-quite-round shape of each controller, the sensor ought to be able to tell left from right—even after you've crossed your arms while playing *Disappointed Parent Simulator 2016.*

Step 3





- Thanks to a handy "eject" arrow, we're alerted that this Touch controller slides open just like any other remote.
- The battery panel is secured by a pretty hefty magnet, and packs a rubber bumper to keep the battery nicely in place.
    - Said battery is a non-rechargeable but perfectly standard AA battery, which you can replace with a rechargeable at the first opportunity. Better these than a glued-in battery!
- This chamber also hosts the model information and point of origin (hello, Dublin!)—plus, we're almost certain there'll be a screw under that sticker.

Step 4







- There are indeed some hidden screws, but even after removing them we're not getting anywhere.
- Looking around for another point of attack, we decide the top is as good a place as any. Smelling glue, we turn up the heat!
- Prying up the control surface reveals gobs of glue, and the cause of our troubles: *another* hidden screw.
- We may not be inside yet, but things are looking up. The Touch is already previewing some tech for us: switches, a metallic pad, and maybe even the first of many IR LEDs.

Step 5

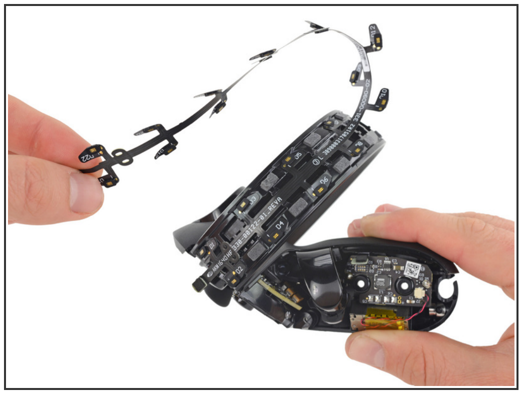


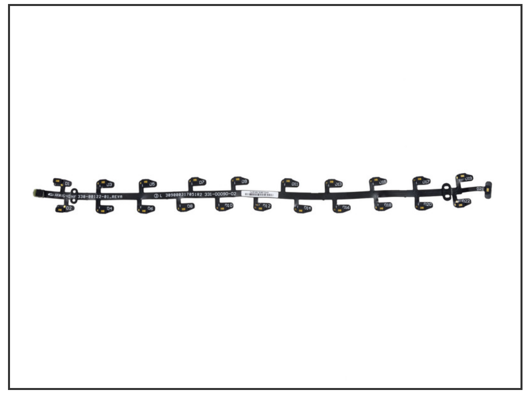


- We're able to remove the final Torx screw with a turn of a Pro Tech Driver.
- The side panel finally bites the dust, and we get our first real look at the internals.
- The boards are densely layered inside these handhelds, but we've already got a peek at what might be a ~~Taptic Engine~~ linear oscillator?

Step 6

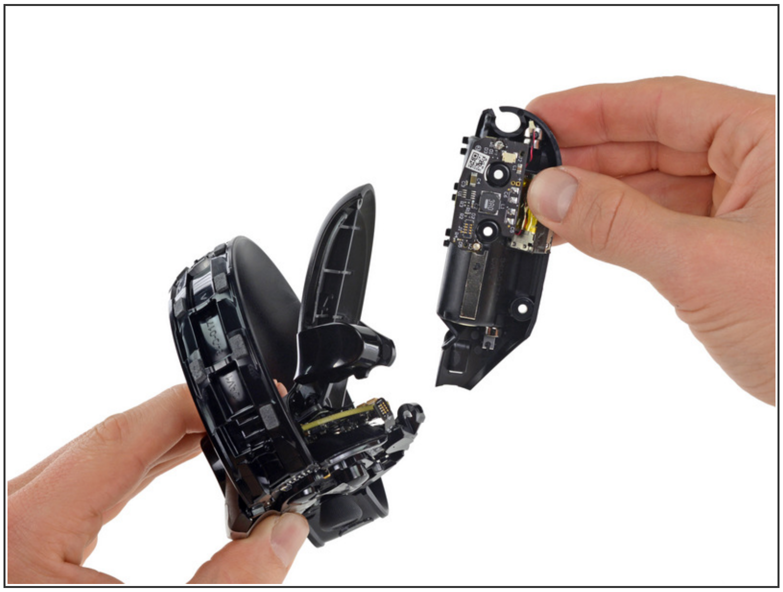


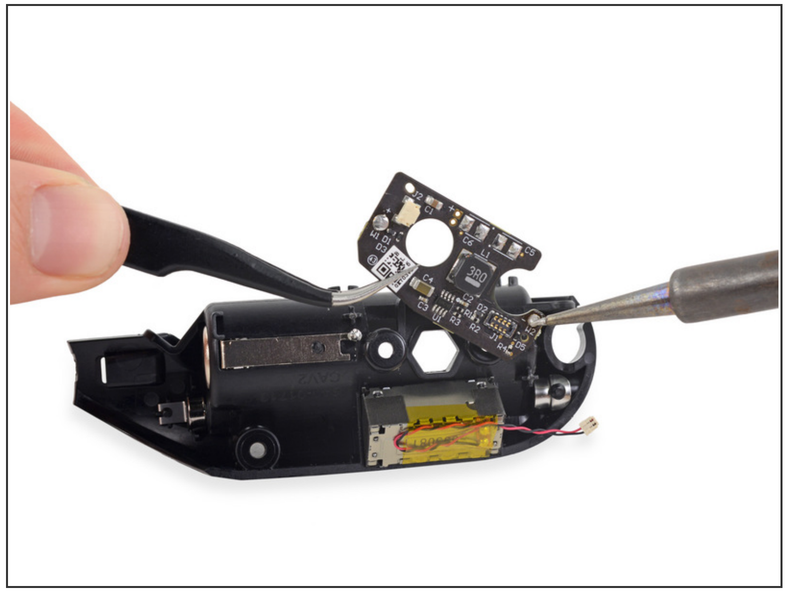




- A few more screws later, the [outer rim](#) of the loop is still attached by a bunch of glue, so there's no recourse but to pry again.
  - No heat is required, just prying, as the adhesive is mild-to-medium flavored.
- Uncovered, the single-cable LED array peels off fairly easily after being disconnected.
- All 22 IR LEDs are conveniently labeled, and there's even a barcode. Cross your fingers for Oculus-provided replacement parts!

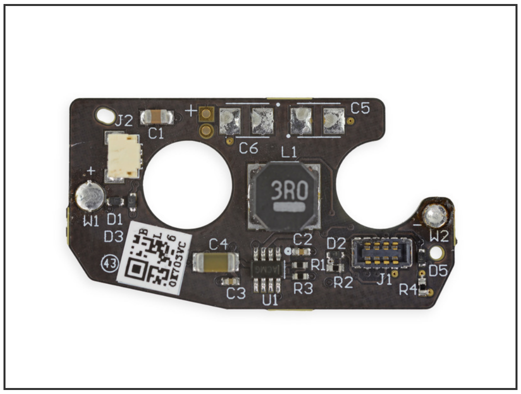
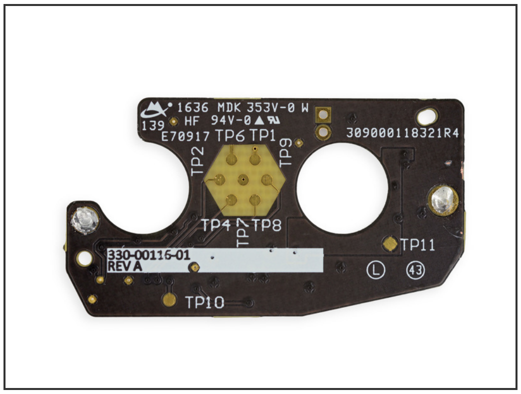
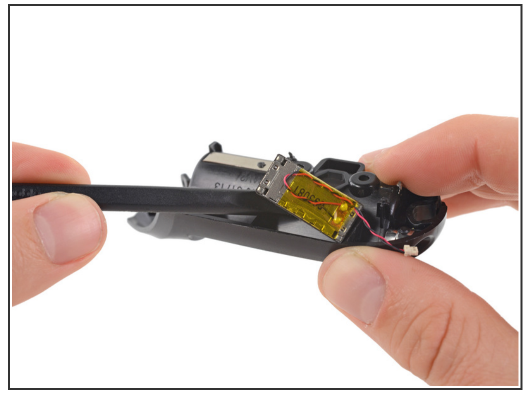
Step 7





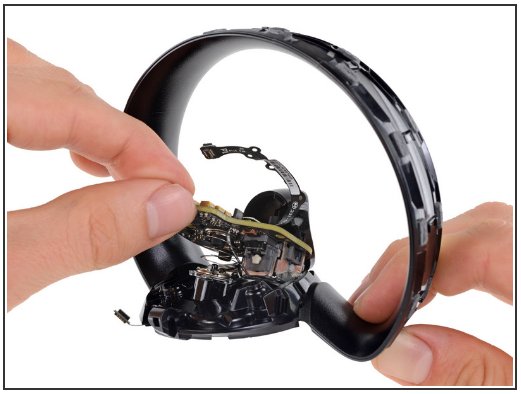
- As we continue on our quest to dismantle the Touch, we strip off the battery caddy.
- Digging a little deeper into the handheld's handle, we find this cute little power distribution board ... that we can't remove without a soldering iron.
  - Y u no connectors, Oculus?

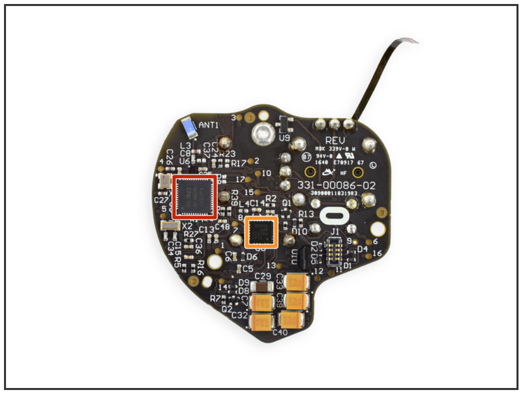
Step 8

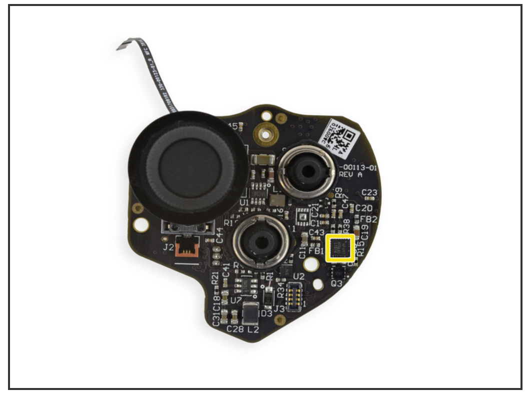




- In addition to a handful of passive components, we spy a couple of empty solder pads—perhaps to make custom LED hacks a little quicker.
- Besides motherboard interconnect and vibrator sockets, we also spy a hexagonal test-point array, accessible from the bottom of the battery caddy.
- The haptic vibration motor takes a little more work (heat and prying) to extract—it's well-secured with glue.
  - Everyone seems to be going linear-oscillator these days—iPhones, MacBooks, Pixel phones, and now VR controllers. Haptics—the simulated feel of the future.

Step 9







- The joystick board appears the be the brains of this operation, it's packed solid with silicon and switches.
  - And two big ol' springs for the XY/AB buttons—probably so they're not too stiff, or too soft, but juuuust right.

  Teardown Update: After some further research and a burn from the soldering iron, we learned that these springs are meant to close the capacitive sensing circuit used in the buttons.

- Chips! Some of these guys look oddly familiar ...
  - Nordic Semiconductor nRF51822 Bluetooth Smart and 2.4 GHz proprietary SoC
  - Analog Devices AD7147 single-electrode capacitance sensors controller
  - Invensense MP651 6-axis combo gyroscope and accelerometer

Step 10

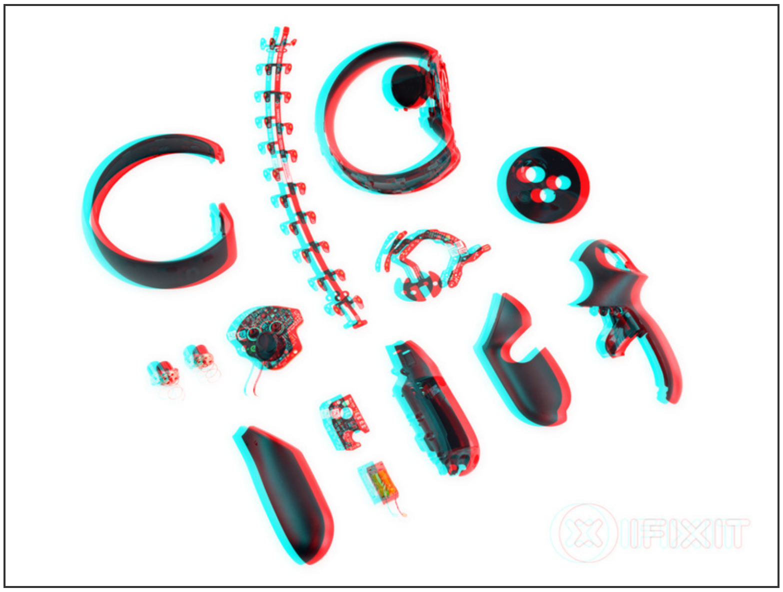




- Last (but not least!), we peel up an action-packed ribbon cable. All told we uncover:
    - Two more IR LEDs—bringing the per-controller total up to 24, the exact number found in the [Vive controller](#).
    - An LED that shines through the top of the controller, presumably as a visible light status LED.
    - A final switch for the Oculus or menu buttons, depending on which controller you're looking at.
    - A spring contact for the conducting pad that turns the "thumb rest" into a [capacitive button](#).
    - This allows players to give a thumbs-up in game, which is pretty important.

Step 11





- We complete our dissection with an anatomical diagram, spinal cord and all!
  - If you missed the Oculus Rift teardown, check it out to learn more about positional tracking and the Oculus Sensors/Constellation system.
  - If you want to scope out the Oculus Rift's competition (controllers and all), check out our HTC Vive teardown.

Step 12 — Final Thoughts



- Oculus Touch Repairability Score: **5 out of 10** (10 is easiest to repair)
  - Battery replacements are quick and easy with a magnetic cover being the only barrier to entry.
  - There are only T5 and T6 Torx screws in the Touch controllers, making screwdriver selection seamless.
  - Accessing the Touch controller internals requires fighting through a thick layer of adhesive.
  - The joystick, button bases, and battery connections are soldered directly to a board and require soldering knowledge to repair.
  - Navigating through the tabs, adhesive, and hidden screws is not intuitive and could result in damage during disassembly.

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